Inspirational Resiliency Visions of Miami Beach, 2070: Environment, Memory, and the Future of Historic Preservation

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Over the next fifty years, climate change will profoundly impact The City of Miami Beach, FL (pop. 87,039), with sea level rising an average of 48'' in its nationally recognized historic districts. The city is outstanding for its fourteen local and four national historic districts containing nearly 2,224 contributing buildings.

This paper explores the collaborative interdisciplinary structure, community engagement, and design results of the past four years of a final-year graduate architectural design studio focused on historic preservation and climate change. In this studio, students have uncovered individual, dynamic building histories and studied predictions for sea level rise that inform more resilient futures. In partnership with City of Miami Beach staff members and elected officials, with sea level scientists and experts in resilience, the design studio has utilized non-conventional resources like Ancestry.com, Newspapers. com, and zillow.com, and traditional archival materials like building cards, new zoning proposals, and existing local and national sources. They examine modifications, inhabitants, and valuation over time. In addition to information about the buildings, students include data about the present and future geological, hydrological, and other environmental conditions and present and proposed zoning regulations.

This paper explores the process of the design studio, the public engagement strategies utilized, and how the students' resiliency visions possibly lay the groundwork for a variety of speculative initiatives ranging from new zoning proposals to a global design competition to help Miami Beach inspire its citizens using historic preservation as a driver of resilience, to a new AI-driven resiliency dashboard to help homeowners make better decisions as they seek to preserve and create more resilient their historic structures. Ultimately, balancing innovative add-on building incentives with fundamental desires to protect the aesthetics of the historic building fabric is now—and will continue to be—an essential element of public debate and engagement.

INTRODUCTION

Miami Beach is one of the world's most vulnerable cities to cli-mate change and sea level rise. While this has long been the case, it came into focus with books and articles that stressed Miami Beach's particular vulnerabilities. The most important of articles that triggered a new way of thinking about resilience in Miami Beach was Jeff Goodell's apocalyptic "Good Bye Miami" in the June 2013 Rolling Stone.[1] Goodell explained that he had been in-spired to think about the vulnerability of the South Florida region during his research and writing on New York's Superstorm Sandy of October/November 2012. Goodell's research on Miami led to his broader 2017 investigation, The Water Will Come: Rising Seas, Sinking Cities, and the Remaking of the Civilized World.[2] But his initial article hit home and caused an awakening through his graphic depiction of a Miami Beach grappling with a fictional 2030 hurricane Milo carrying 175-mph winds and creating a 24-foot storm surge that kills more than 800 people.

This article and the growing interest in the impacts of sea level rise on South Florida resulted in several other efforts and publi-cations in the following years. These included the ambitious and influential 2015 exhibition and panel discussion called Designing the Resilient City, sponsored by FIU and the Consulate General of the Kingdom of the Netherlands in conjunction with the ex-hibition "MIAMI 2100" co-curated by FIU professors Marilys Nepomechie and Marta Canavés and exhibited in the Coral Gables Museum.[3] Likewise, in 2015, an oft-referenced article in Vanity Fair shed light on the design work of Isaac Stein.[4] As a University of Miami undergraduate, Stein drew sections and renderings of Miami Beach with a rise of 4-5 feet in sea level. This article popularized the idea of using renderings to visualize incremental solutions to sea level rise. It was referenced fre-quently, for example, by the late Commissioner Mark Samuelian (1963-2022), who, while closely working with Aris Papadopoulos, a co-author of this article, included a reference to it in the 2020 Resolution adopted by the City of Miami Beach to engage in Inspirational Resiliency Visions of the City.[5]

Figure 1. Example of student data collection on historic and contemporary residents, including owners, builders, and architects. Image credit: Jessica Suhr.

With over 2,000 buildings designated as "contributing" to their local historic districts, the social, cultural, and economic character of Miami Beach is defined by its historic architecture. While most frequently noted are its many buildings in the Art Deco and stream-lined moderne styles, the city's Historic Districts also boast many examples of vernacular, Mediterranean-revival, midcentury modern, and outstanding examples of contemporary buildings, all of which contribute to its exisitng fabric. Even before 1979, when the Miami Beach Arts Deco District was established as the first urban twentieth-century Historic District in the National Register of Historic Places, there were debates over land use development rights in the city.[6] In the second decade of the 21st Century, these debates expanded and intensified with the increased awareness of the vulnerabilities of a vast number of privately-owned historic multi-family dwellings to the challenges of climate change and sea level rise.

In 2017, responding to these challenges, Laura Weinstein-Berman, while studying at Columbia University's Graduate School of Architecture, Planning and Preservation, produced an excellent master's thesis entitled The Progression of Historic Preservation in Miami Beach and the Challenges of Sea Level Rise.[7] In this work, Weinstein-Berman lays out the history of preservation efforts and argues in support of the vital economic resources in the historic building fabric. Aware of the Rockefeller Foundation's recent actions of 100 Resilient Cities, Weinstein-Berman echoes and amplifies the need for interdisciplinary and multi-governmental efforts to address these solutions through her in-depth local research. Weinstein-Berman's study and contributions have become essential to student learning in the Inspirational Visions studio.

Also, in 2017, Dr. Tiffany Troxler, Director of the FIU Sea Level Solutions Center and John Stuart organized a series of five Sea Level Rise / Historic Preservation dialogues to promote the respectful sharing of ideas and opinions at the FIU College of Communication, Architecture + The Arts, Miami Beach Urban Studios, a neutral university facility located in the heart of Miami Beach. The dialogues brought together community members, public officials, architects, developers, and students to ideate in small focus groups before everyone was brought together to review the seven areas of possible convergence or agreed-upon foundations that rose to the surface from the various perspectives in the community. A notable observation was that images are essential to successfully relaying complex ideas to people of different interests, levels of understanding, and backgrounds. Zoning concepts like floor-area-ratio were tricky and often confusing to the general public but were wielded with authority by developers. In response, starting in 2018, FIU's Inspirational Visions of the Future of Miami Beach 2070 Design Studio for final-year architecture students has been offered in partnership with the City of Miami Beach, a variety of scientific collaborators, local architects, and members of the community. [Figure 1]

HISTORIC PRESERVATION AND THE DYNAMIC HISTORICAL NARRATIVE OF HISTORY

The Design studio begins with an introduction to the concept of local architectural history on Miami Beach. The class studies Weinstein-Berman's thesis for the broader discussions of the history of the historic preservation movement and to help them to think critically about historic preservation, including its legal and structural frameworks, in Miami Beach today.[8] They need to know because, in almost every case, they will propose how the current frameworks must be modified to plan for the inevitable economic and physical shocks and climate change stressors.

Students visit the assigned block of buildings selected for study by Debbie Tackett, Head of Historic Preservation for the City of Miami Beach Planning Department, and her colleagues. Over the years, study areas have been selected by Tackett and her colleagues for various reasons ranging from their vulnerability to sea level rise, their vicinity to parks and shopping areas, or

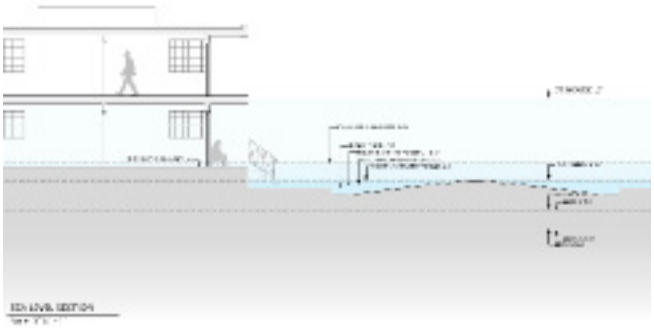

Figure 2.Student study of sea level rise. Image credit: Jordan Pabon.

their exposure to the expansion of commercial into traditionally multi-family residential areas. Students select a single site as their point of departure when working individually or in groups. They work with the information in the City Archives about the building, including a scan of the official municipal "Building Card," which contains information on the building's ownership, construction, modifications, and sometimes historical drawings.

DYNAMIC HISTORICAL NARRATIVES

Each student team is then asked to interrogate the historical data about the architect, the owner, and the contractor from the building card against the information found in local newspapers (many found on Newspaper.com), historical telephone books, Sanborn maps, and from deep dives into census data, birth and death records, and other sources found on Ancestry.com. Far from taking the information from the official municipal source as unassailably accurate, students learn to think critically about archival sources and their buildings' histories as stories con-tinuously unfold over time. Students explore whether earlier buildings were torn down to build the current structure on their site and seek connections between the architects, owners, and contractors. They look for commonalities of language or ethnic or cultural backgrounds and contacts through clubs or religious institutions that may have brought the team together. They note and consider what these mean in terms of the context of broader historical phenomena in the city. Likewise, students seek to understand whether their particular team of architects/owners/contractors—or individual team members—completed other projects together and, if so, where their building is situated in that partnership timeline. These discoveries form the basis for thinking about historical narratives (and, by extension, buildings) as the product of dynamic forces and playing a role in the dynamics of urban life.

Following their studies of the owners, architects, and builders, students undertake an exploration of those who lived in the building over time. They start, to the extent possible, by looking for where the address appears in local newspaper ads. They often find ads for apartments for rent or small businesses operat-ing out of their buildings. They encounter tenants in marriage and death announcements, incident reports, and ads for the so-cial clubs they create or participate in. Students are encouraged to continue their explorations of tenants and, often owners, to the current day, by examining county property records and cross-referencing those with LinkedIn.com. Students are encouraged to reach out to residents they find on LinkedIn. The hope is that they will meet and develop connections with them to build bridges between the studio work and the community and better understand the nature of their engaged research and its possible impacts on the community.

Of equal importance is the discovery of how the building was historically laid out and how that differs from today's situation. They study the building's stylistic details and use historical documentation on the number of apartments in the building, supplemented by observation on the ground, to draw the floor plan of the building when it opened and how it has been modi-fied today. Today, they glean information about building layouts from sites like the Miami Dade County Property Search, Realtor. com, and Zillow.com. These often help students realize that, over time, many historic buildings in Miami Beach have consolidated smaller apartments into larger ones to accommodate the mar-ket needs of current homeowners and tenants. They are asked to question whether this will continue to be their vision of the future of the city and its historic fabric. In addition, students think about the connections that existed to bring these historic building projects to fruition; they contemplate what they un-cover about the communities in and around their buildings over time and ask themselves how these might change again in their visions of 2070.

Before leaving this course module, students will have had contact through lectures and critiques with Deborah Tackett and Laura Weinstein, as well as presentations by leading local architects, including Carlos and Jacqueline Touzet, known for their sensitive work with historic preservation in dynamic contexts.[9] They share their research with these professionals as they synthesize their dynamic building histories into timelines with headlines they will use as guides during the rest of the semester as they develop their projects.

CLIMATE CHANGE AND HISTORIC BUILDINGS

With their new understanding of their existing historic buildings as far from static entities, students then turn to the dynamic changes related to climate change and sea level rise. While these students have completed the program's sustainability design studio, they often still need guidance when applying sustainability principles to specific sites. Dr. Obeysekera, the Director and Research Professor at FIU's Sea Level Solutions Center in the Institute of Environment, and a co-author of this paper, directs the way forward. Dr. Obeysekera introduces students to the sources of global and regional sea levels, explaining the

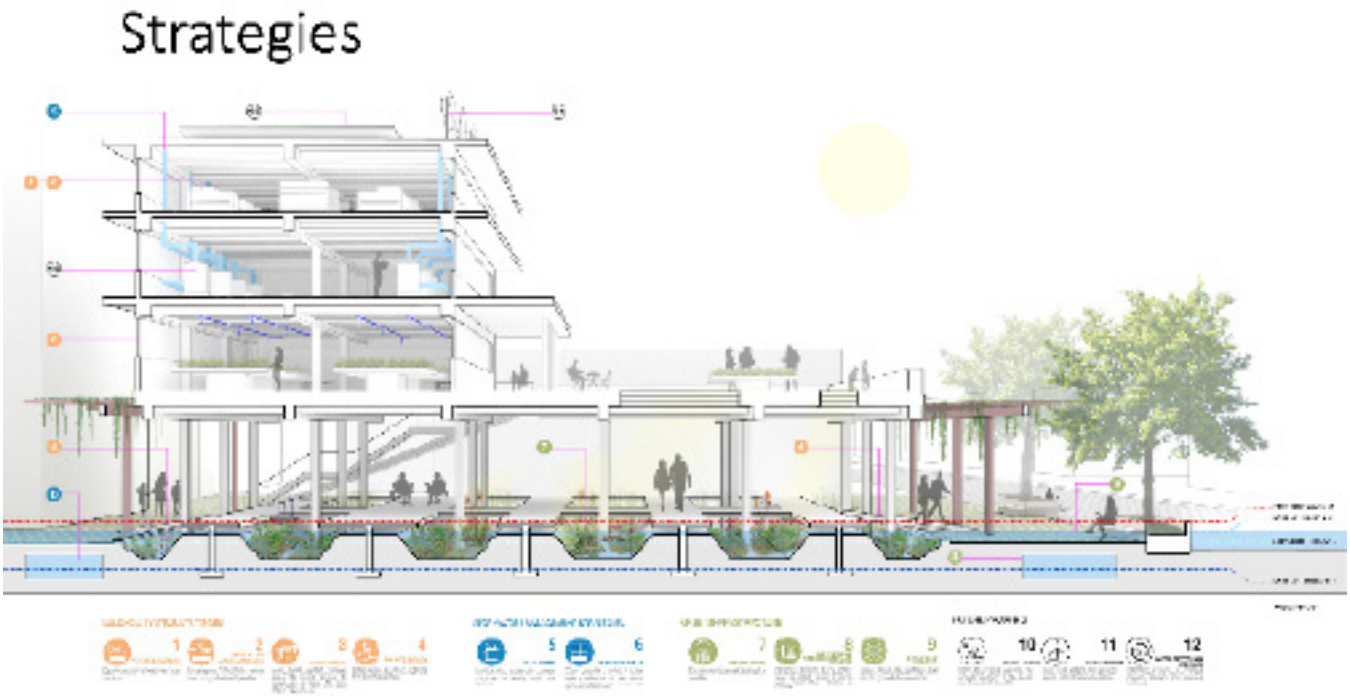

Figure 3. Student study of 2070 resilience strategies. Image credit: Gregory Rendon.

work of NASA's ECCO (Estimating the Circulation and Climate of the Ocean) and emphasizing the many factors, including vertical land movement, ocean dynamics, and gravitational effects that come together to determine local and regional sea levels past, present, and future.[10] The class discusses the importance of the Arctic and Antarctic regions and how they impact global sea level rise. They look at how regional currents and climatic conditions will allow changes in the Arctic and Antarctic regions to affect different localities. Dr. Obeysekera takes students through the various Sea Level Datums used when measuring sea level and how these are measured relative to one another. Students are encouraged to consider their projects within the North American Vertical Datum of 1988 (NAVD88), the most commonly used datum in the City of Miami Beach for sea level measurements. [Figure 2]

Sea Level projections are a central part of Dr. Obeysekera's discussion with students and are especially important to the concept of envisioning the future in 2070. He starts with the Sixth Assessment Report of the United Nations Intergovernmental Panel on Climate Change, which outlines five Shared Socioeconomic Pathways, each leading to divergent outcomes.[11] Shared Socioeconomic Pathway 1 (SSP1) "Taking the Green Road" is the most optimistic and predicts the lowest sea level rise and climate change levels. Other pathways, in order of increasing levels of expected sea level rise, include SSP2 Middle of the Road, SSP3 Regional Rivalry, SSP4 Inequality—a Road Divided, and SSP5 Fossil-fueled Development. In this part of the discussion, Dr. Obeysekera emphasizes how necessary societal actions are in predicting climate outcomes and how critical students' assumptions will be in suggesting specific visions for the future of Miami Beach. As a leader in the local four-county Southeast Florida Climate Change Compact that produces and updates the "Unified Sea Level Rise Projection," Dr. Obeysekera explains the various projection levels produced by the compact and helps students to understand which to use in their proj-ect predictions.[12] Included in these predictions is a review of the characteristics of the South Florida landscape, known for its low topography, high groundwater table, sandy soils and extremely porous geology, and the extreme complexity of its water management systems. Ultimately, Dr. Obeysekera introduces students to an approach to planning for the future that involves "Dynamic Adaptive Policy Pathways" designed as a roadmap for decision-making that includes all decisions over time and under conditions of uncertainty and includes short-term actions, long-term options, and signals for adaptation.[13]

In support of Dr. Obeysekera's discussion, Aris Papadopoulos, a Distinguished Expert in Resilience at FIU's Sea Level Solutions Center and FIU's Extreme Events Institute and Founder and Chair of the Resilient Action Fund and Resilient Action Fund (International), spoke about preparing for shocks to building fabric.14 Papadopoulos emphasized to the students that the

Figure 4. Student study of 2070 green infrastructure, roofs, gardens and streets. Image credit: Sophia Neves.

past fifty years brought us dynamic change, including the destructive force of hurricane Andrew, the rise of the Historic Preservation movement on Miami Beach, the establishment of Florida International University, an awareness of climate change, and global responses to COVID, very few of which were predicted To his point, the next fifty years, the timeframe of the students' visions, may be equally unpredictable. From his perspective as a Resilience expert, Papadopoulos outlines the resiliency issues for the City of Miami Beach as being six-fold: Sea Level Rise and Hurricanes, the balance of historic preservation and adaptation, concerns over public streets vs. private properties, the future of tourism, investment, and values, how to manage public finances and services, and enhancing the quality of life while addressing affordability. He laid out for the students that the environmental shocks of the future will include hurricanes with winds greater than 170 mph, storm surge greater than fifteen feet, tidal flooding of greater than five feet, extreme rain events, water table rise and increased water salinity, and fires. One way to think about the shocks was through the wake-up call of the sudden collapse of Champlain Towers South, a 12-story residential tower just over the border of Miami Beach in Surfside.

Focused primarily on issues around resilience and private property ownership, Papadopoulos gave students an outline of an adaptation toolbox for historic buildings that included repairing and reinforcing structures, wet and dry floodproofing, rebuilding internally, adding new additions to existing buildings, and even elevating buildings if the cost is not prohibitive. He connected that to a property resiliency checklist that would guide homeowners through evaluating their existing conditions. The eight elements on the property checklist included: the elevation level of the first occupied floor, the elevation level of mechanical and electrical equipment, results of the latest structural inspection, evaluation of completed renovations, the existence of hurricane windows and doors, the current market value of the property, the cost to insure the property, and who the owners are and how many years have they owned their home. He likewise inquired as to the character of the owners. Are they early or late adopters of resilience strategies? Or do they wait until a disaster to adapt their building? Do they ultimately opt out altogether? These adaptation strategies for buildings, Papadopoulos points out, may include future technologies for elevating or floating structures, using advanced materials, mobility, and logistic solutions, as well as new technologies for information, work, and

recreation. With his background in managing large businesses, Papadopoulos emphasized to the students the need to consider how a property owner would pay for resilience adaptations on their property. Would they be able to pay for them by leveraging the potential appreciated value of their existing property? Or would they be allowed additional income through expanded use and the possible addition of commercial activity? In summary, Papadopoulos's messages to the architecture students were to remain optimistic about the future, to think of sustainability as the intersection of green and resilient responses, to plan for the worst, to seek out breakthrough technologies, and to value the history and qualities of historic buildings.

Building on the global and local science behind sea level rise presented by Dr. Obeysekera and the discussion of shocks, particularly to building fabric hosted by Aris Papadopoulos, City of Miami Beach Chief Resiliency Officer Amy Knowles pointed to the City's "Comprehensive Plan 2040," which was adopted in 2019 and laid out guidelines for future resilient development in its "Resilient Land Use and Development Element," and establishes city-wide priorities for decision-making. She argued that students should start reading and understanding comprehensive plans as they will be guidelines for future architects interested in supporting the work of the City. Knowles also pointed to the City's recent "Blueways Master Plan," which supports the development of transportation in and around the city by water, and the "Urban Forestry Master Plan," which provides strategies to harness the power of trees to mitigate the impacts of climate change, and "Buoyant City," the city's first comprehensive guidelines for creating resilience in the city's Historic Districts. Knowles requested that the students include in their projects bioswales, rain gardens, cisterns or rain barrels, permeable surfaces, and regrading when needed. She echoed Aris Papadopoulos' call for buildings to be wet or dry floodproofed, to have elevated appliances, flood vents, and bar-riers, and raised floor elevations whenever possible. Armed with their building's histories, both physical and sociological, and with information about sea level science, building resilience strategies, and the plans and guidelines from the City of Miami Beach, the students were prepared to take "Buoyant City" for a test drive and consider how their buildings might phase in resilience strategies to reach 2070.

RESILIENT DESIGN RESPONSES

Equipped with these municipal resources and guided by the data and hypotheses about their historic building's material and sociological conditions, each student undertakes to envision their historic projects over time. Depending on how the students respond to risk, they think of the various windows of time for the many steps to be taken. Accommodating more significant rain events, stronger storms, higher storm surges, and higher king tides with moderate sea level rise will be critical in the first decade of their study.

Students assume the professional position of a new kind of resilience architect, one who knows the past of the building—in many cases better than the owner(s)—and is empathetic to the variability of client risk aversion. They consider the location of mechanical and HVAC infrastructure on the site, the configura-tion and types of building foundations when determining the feasibility of adding cisterns, rain gardens, stormproof windows, flood-proofing (wet or dry) first floors, and other accommoda-tions. Likewise, they consider plans in place by the city to raise the level of the streets immediately, if they are particularly low-lying and important to emergency transportation, and in the longer term.

Within the compressed time frame of the studio, students then contemplate modifications on the first floors from residential programs to more episodic uses, service-based, office, or retail to continue the life of the building and add the income required to make the resiliency modifications. Students then determine where the displaced families from first-floor units will be relocated on the site. They consider the possible mechanisms for determining the fairest redistribution of tenants or owners. Relying on guidelines found in "Buoyant City," students consider how their building type might accommodate increases in the "floor area ratio" (FAR) necessary to support the existing community as well as the contingencies of the site. While engaged in this process, students explore the fifty-year window for the implementation of resiliency-driven modifications in their buildings. [Figure 3]

Even though each student has focused on their individual building in detail, in the last module of the studio, each is asked to look outward from their building, keeping all that they know about its resiliency strategies, and create renderings of the community starting with their building façade and entry sequence, the side-walks and streets around their building and collective spaces. They are asked to envision how their building and those around them may support local community resilience through commu-nity gardens, increased tree canopy, enhanced public amenities, improved transportation, localized storm shelters, emergency food pantries, and backup energy storage. Finally, the students are asked to include themselves, fifty years in the future, in their 2070 renderings. [Figure 4]

Students reflect upon the historic and contemporary communities they discovered in their research and consider their imagined future community in a critical dialogue across time with the past communities. They ask themselves what historic preservation will become in light of resiliency challenges. In the final analysis, students reflect on the future of memory.

What will be the hallmarks of our collective memories in fifty years? How will historic districts and places continue to hold the emotional and economic value that they do today? What political strategies will be needed to help us collectively understand cultural value? What AI-driven technological interfaces will be needed to help people understand in a meaningful way the social, ethnic, political, material, and design histories of places like the Historic Districts on Miami Beach? Students imbue in the rendering details their ideas for these and many other solutions. Likewise, Amy Knowles, the Chief Resiliency Officers for the City of Miami Beach, utilizes these visions of the future to inspire community members and elected officials to consider the possibility that, at least within the fifty-year time frame, with the best policies in place, Miami Beach may be a beacon of hope for a more resilient future. With this feedback loop, the university and the city continue to iterate on the idea of the value of the inspirational vision of the future.[19] [Figure 5]

Figure 5. *The Loop*. Aubrey Sanders and Hannah Miracle.

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